



# HEPATOLOGY

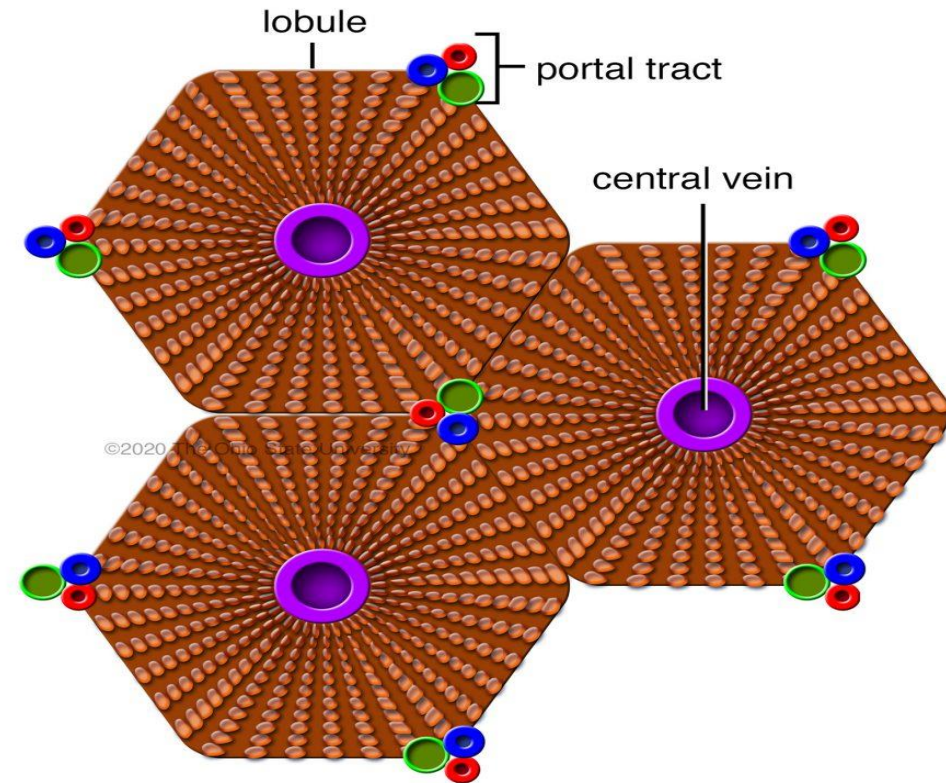
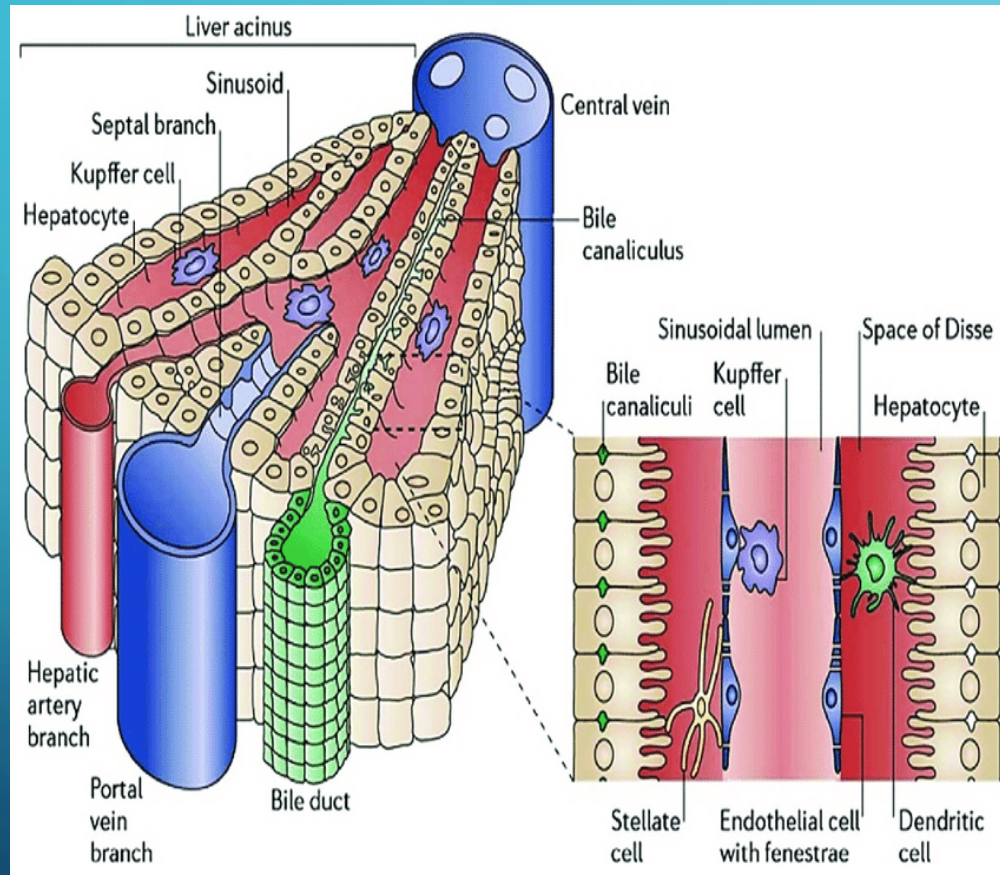
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# FUNCTIONAL ANATOMY & PHYSIOLOGY

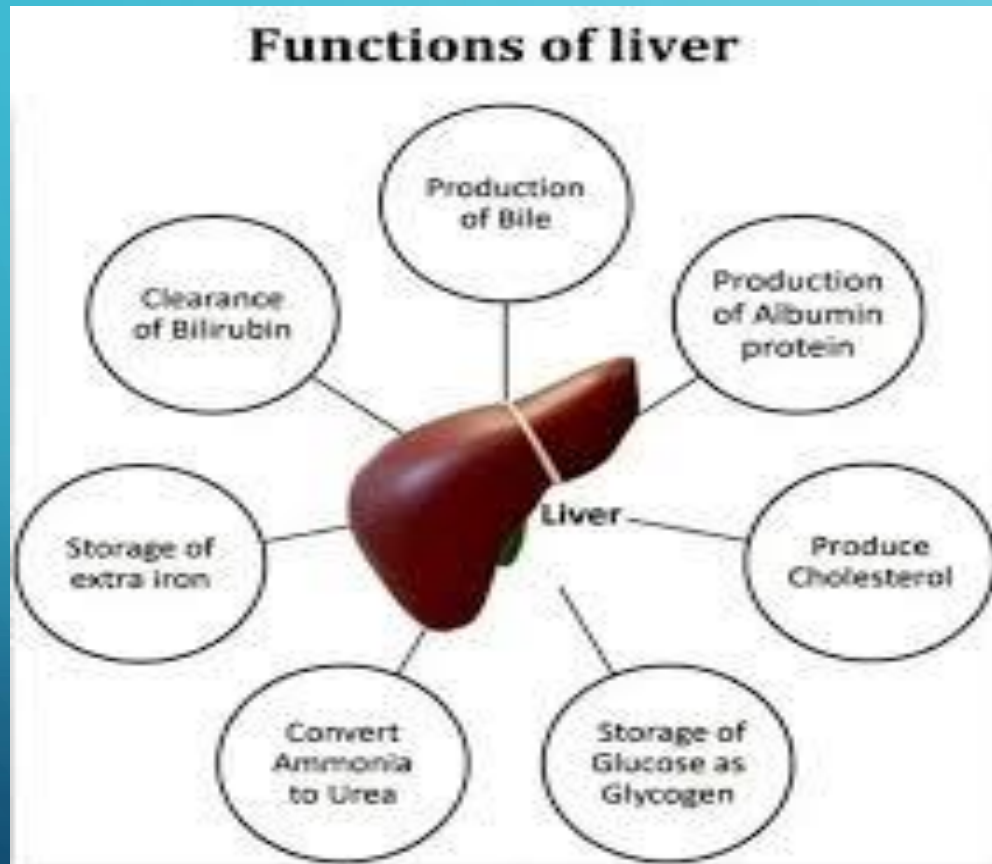
- The liver weighs 1.2—1.5 kg & has multiple functions including key roles in metabolism , control of infection , elimination of toxins & by-products of metabolism.
- It is divided into right & left lobes by falciform ligament, but the functional division into right & left hemilivers based on the blood supply is more useful.
- These further subdivided into eight segments by the hepatic & portal veins.
- The functional unit of the liver is the acinus, in which the blood flows via the a single branch of portal vein & hepatic artery situated centrally in the portal tracts.
- Bile is formed by active & passive excretion by hepatocytes into the channels called cholangioles, which flows in the opposite direction from the periphery of the acinus.

# LIVER ANATOMY





# THE FUNCTIONS OF THE LIVER



## **FUNCTIONS OF LIVER**

- 1) Secretion of bile
- 2) Storage of glycogen
- 3) Metabolism of fats
- 4) Deamination of amino acids
- 5) Production of the plasma proteins.
- 6) Storage & transport of vitamins & minerals.
- 7) Storage of iron .
- 8) Production of clotting factors .
- 9) Production of heat .
- 10) Detoxification.
- 11) Acts as filter

# PRESENTING PROBLEMS IN LIVER DISEASES

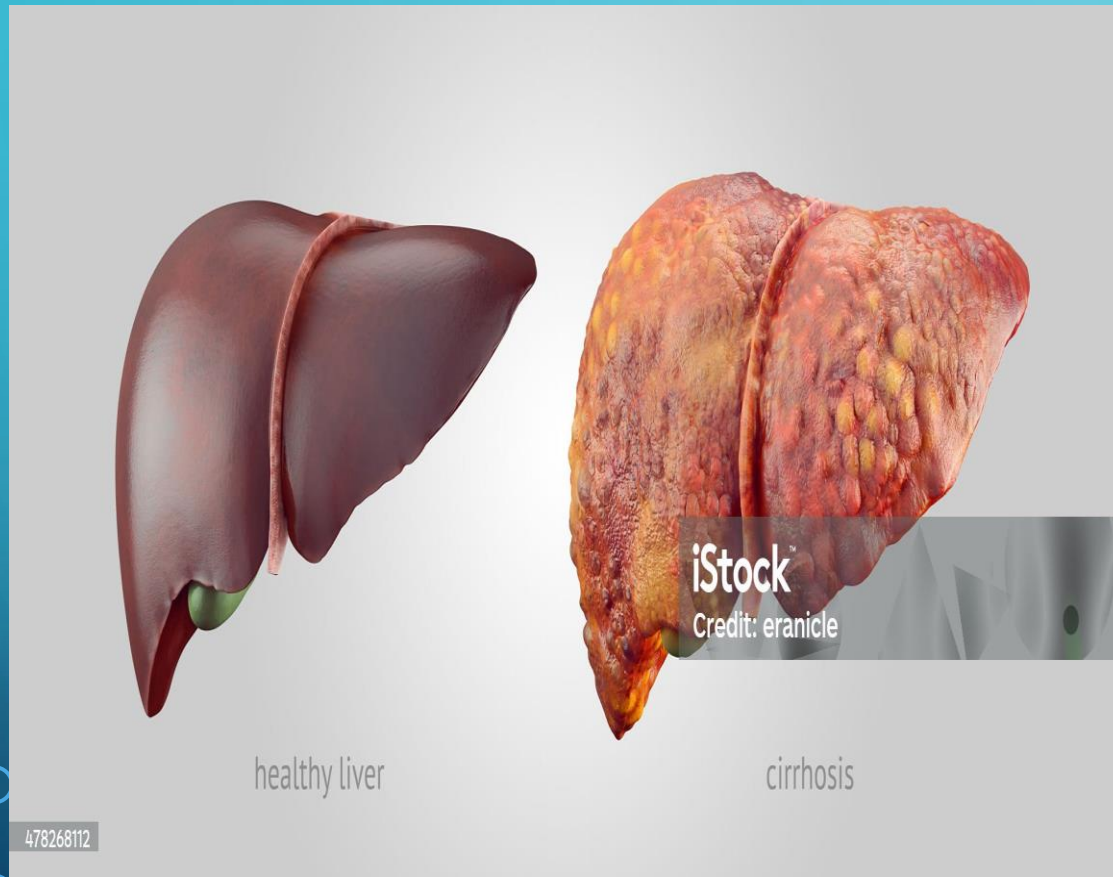
- Hepatic diseases can present in a variety of ways , sometimes being asymptomatic , & discovered by laboratory investigations. The features of hepatic disorders could be:
- 1-Jaundice: in cases of viral hepatitis ( A,B,C,D,E) , acute & chronic liver diseases & hepatic failure, but sometimes jaundice occur in cases of excessive hemolysis not due to liver disease. The itching , color of urine & stool can with other clinical feature can help to differentiate the cause.
- 2-Acute hepatic failure & hepatic encephalopathy.
- 3-Abnormal liver function tests : elevated liver enzymes ( SGOT, SGPT, ALK.Phosphatase,Bilirubin,prolonged PT, Low S.Albumin).
- 4-Portal hypertension , Ascites, & esophageal varices with or without bleeding.
- 5-Hepatomegally: in acute & early chronic liver diseases such as early cirrhosis.
- 6-Finger clubbing, dupuytren's contractures. leonychia, caput medusa, feto hepaticus,gynecomastia, testicular atrophy, flapping tremor.

# FEATURES OF HEPATIC DISEASES (CAPUT MEDUSA)





# FEATURES OF HEPATIC DISORDERS



# JAUNDICE

- Jaundice is usually detected when the plasma bilirubin exceeds  $40\mu\text{mol/L}$  ( $\sim 2.5\text{mg/dl}$ ). the causes of jaundice overlap with the causes of abnormal LFTs. it is useful to classify jaundice according to the causes & whether the cause is prehepatic, hepatic or post-hepatic, & usually we find clues in the history which can help us to recognize the primary site of disease.
- 1-Pre-hepatic: either due to hemolysis or congenital hyperbilirubinemia. The liver can handle normally six times greater load of bilirubin. The most common cause of non-hemolytic hyperbilirubinemia is Gilberts syndrome.
- 2-Hepatocellular jaundice: either due to acute or chronic liver injury. The main causes of acute liver injury are infection ( hepatitis A,B,C,D,E), alcohol, autoimmune, hepatoma, drugs & toxins & ischemia. Usually get elevated SGOT & SGPT enzymes.
- 3-Post-hepatic : usually called obstructive jaundice, due to biliary stone, primary biliary cholangitis, Ca. of head of pancreas. Usually get elevated Alk.phosphatase.



# ACUTE HEPATIC FAILURE

- The main feature of acute hepatic failure is 1-hepatic encephalopathy , 2-jaundice ,3- bleeding tendency ,4- ascites , which occur more frequently in case of acute on chronic liver disease. e.g. use of hepatotoxic drug in cirrhotic patient.
- Causes of fulminant hepatic failure :
  - 1-Infection : hepatitis B, C & Delta agent, these three agents are the cause of chronic liver disease, while hepatitis A & E cause only acute liver infection .
  - 2-Drugs : isoniazid , rifampicin , halothane , paracetamol .
  - 3- Metabolic & hereditary : Wilson's disease,  $\alpha$ 1-antitrypsin deficiency .
  - 4-Vascular : trauma with liver ischemia , veno-occlusive disease.
  - 5- Autoimmune : Chronic active hepatitis .
  - 6-Cholestasis : biliary stone , tumors.

# HEPATOMEGALY

- Causes of hepatomegaly are:
- 1-Liver metastasis.
- 2-Multiple or large hepatic cysts.
- 3-Cirrhosis ( early): due to non-alcoholic fatty liver disease, alcoholic liver disease, haemochromatosis.
- 4-Hepatic vein outflow obstruction..
- Infiltration : amyloid.
- Small liver could be seen in the later stages of cirrhosis.

# CHRONIC LIVER DISEASE & CIRRHOSIS

- Cirrhosis is characterized by diffuse hepatic fibrosis & nodule formation. It can occur at any age, & has significant morbidity & is important cause of premature death. It is the most common cause of portal hypertension & its complications. The main causes of cirrhosis are:
- 1-alcohol.    2-chronic viral hepatitis.    3-NAFLD.    4-Immune : PSC, CAH.
- 5-Biliary : PSC, secondary biliary cirrhosis , cystic fibrosis.
- 6-Genetic: hemochromatosis, Wilson disease,  $\alpha$ 1-antitrypsin deficiency.
- 7-Cryptogenic : unknown ( in 15% ).
- 8-Chronic venous outflow obstruction.
- 9-Any chronic liver disease.



# INVESTIGATIONS OF LIVER DISEASES

- 1- Liver blood biochemistry: called LFTs which include S.bilirubin , aminotransferase ( SGOT, SGPT ) , alkaline phosphatase,  $\gamma$ -glutamyl transferase & S.albumin. These are usually rise in cases of liver injury, while the real LFTs are serum albumin, PT & serum bilirubin level.
- In hepatocellular liver injury SGOT , SGPT & deranged other liver functions will occur. While in obstructive liver injury , alkaline phosphatase,  $\gamma$ -GT are elevated more than the aminotransferase levels. Other tests such as Na + , Bl,urea, glucose, S.ferritin are used in specific conditions.
- 2-Hematologic tests: CBC, for anemia, platelet count, coagulation tests ( PT) are useful for diagnosis & follow up of the patients.
- 3-Immunological tests: for liver auto-antibodies ( ANF, AMA, ASM ) & serum levels of IgG, IgM & IgA are also elevated.
- 4-Virology screen: for HAV, HBV, HCV, Delta agent , & HEV, also for other viruses .
- 4-Imaging studies: Ultrasound , CT, MRI , MRCP .
- 5-Endoscopic studies: OGD for esophageal varices, ERCP, endoscopic US.
- 6-Liver biopsy: for diagnosis & staging of liver pathology in cases of cirrhosis, infiltrative lesions, hepatoma,

# HEPATIC ULTRASOUND 1

## MALIGNANT



HCC (mixed echogenicity)



HCC (hypoechoic)

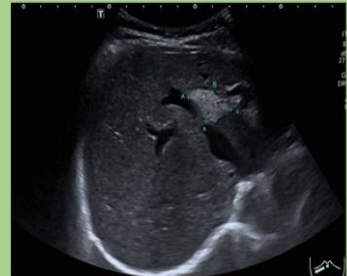
## BENIGN



Cyst



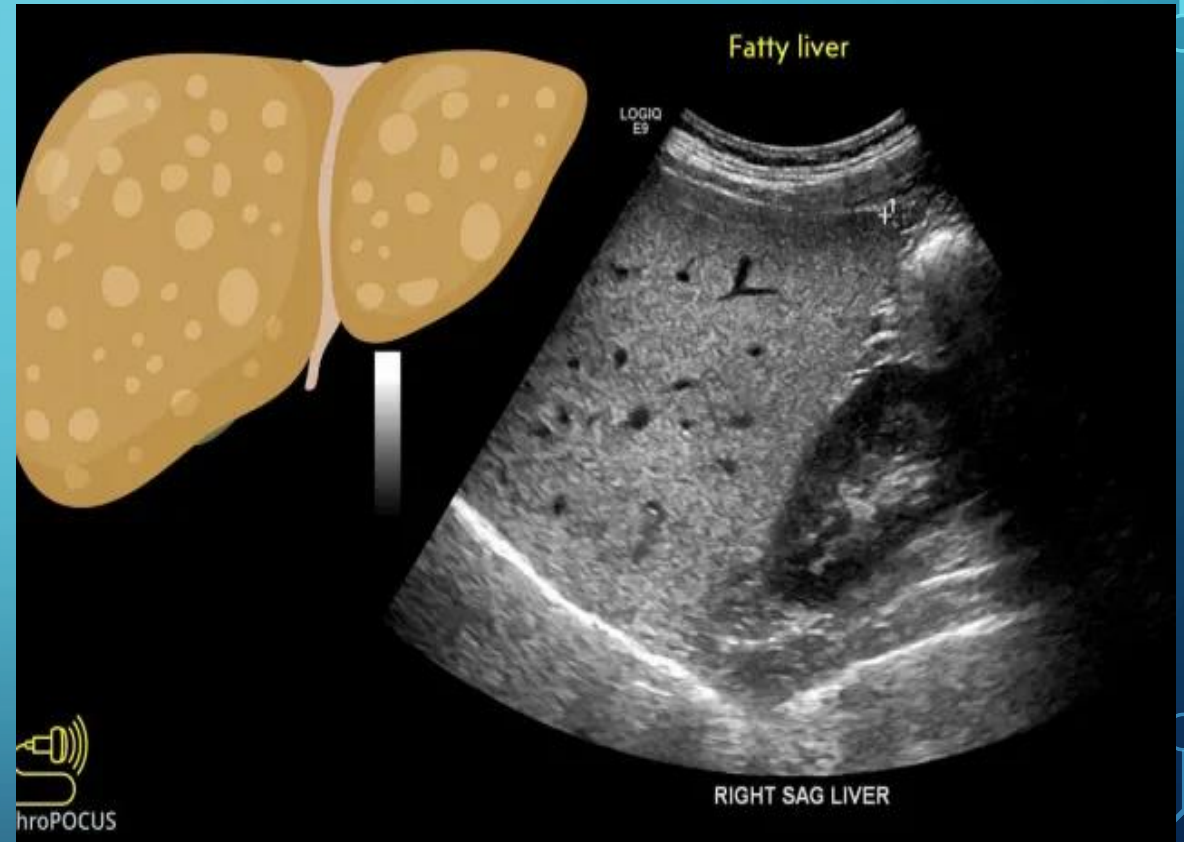
Hemangioma



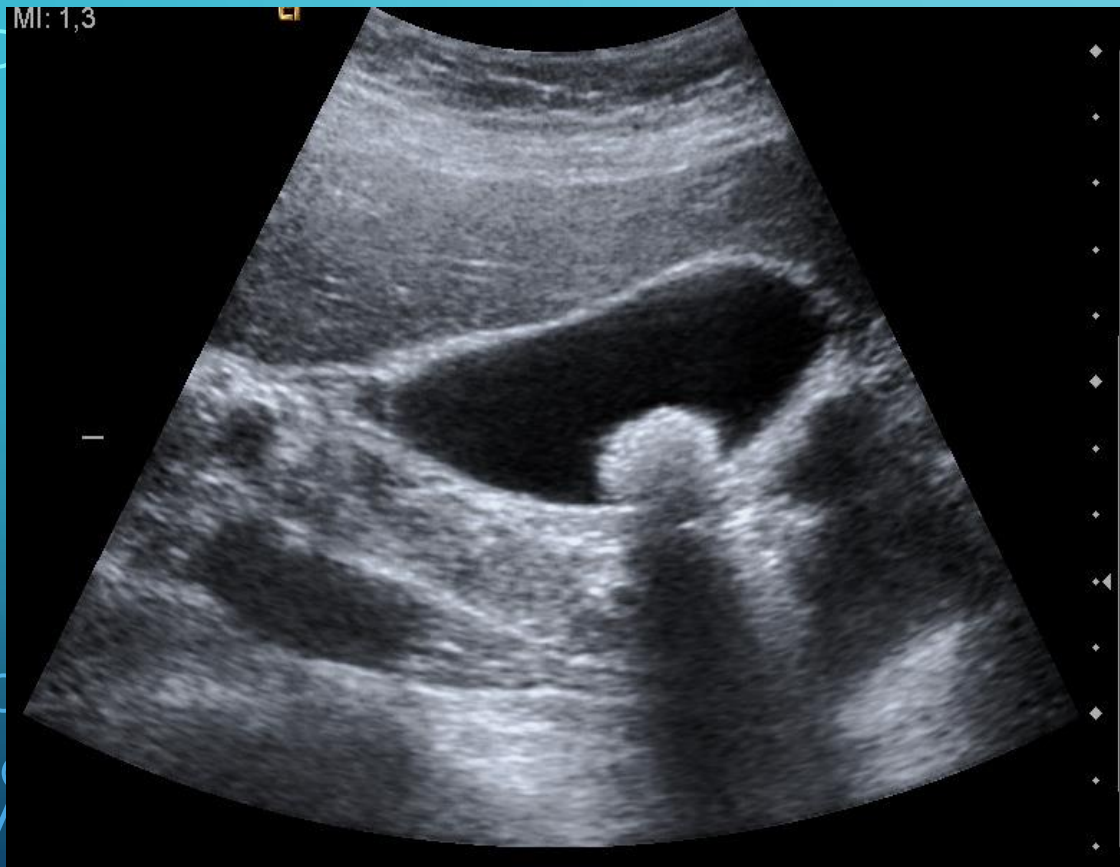
Focal fatty infiltration



Focal fatty sparing

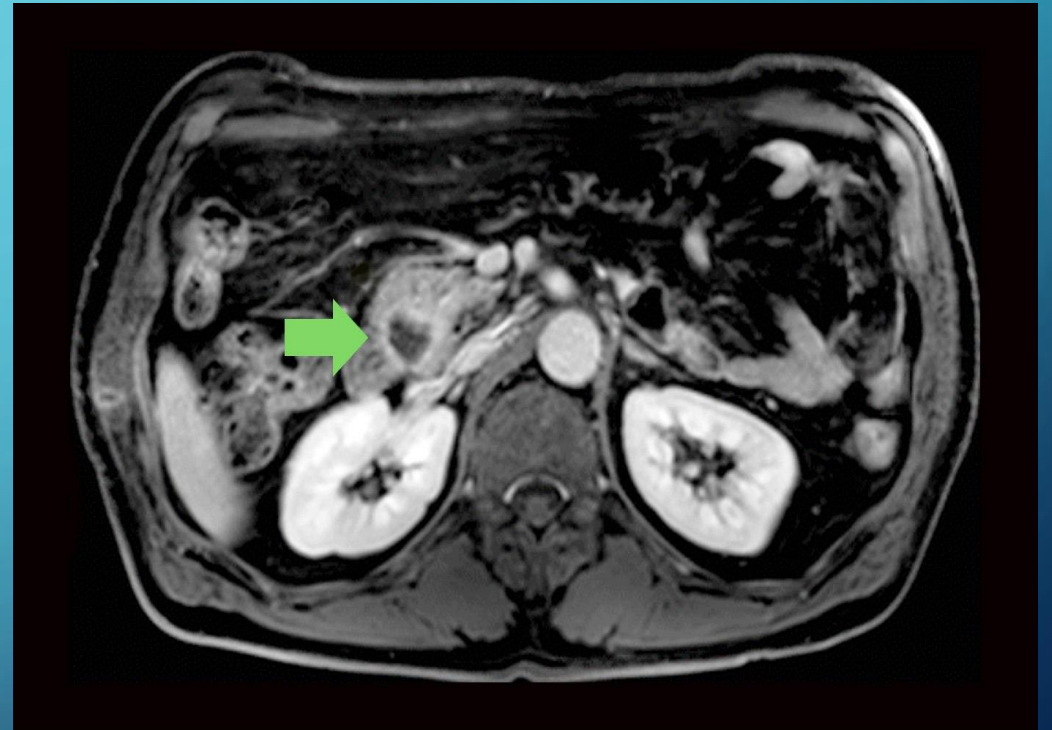
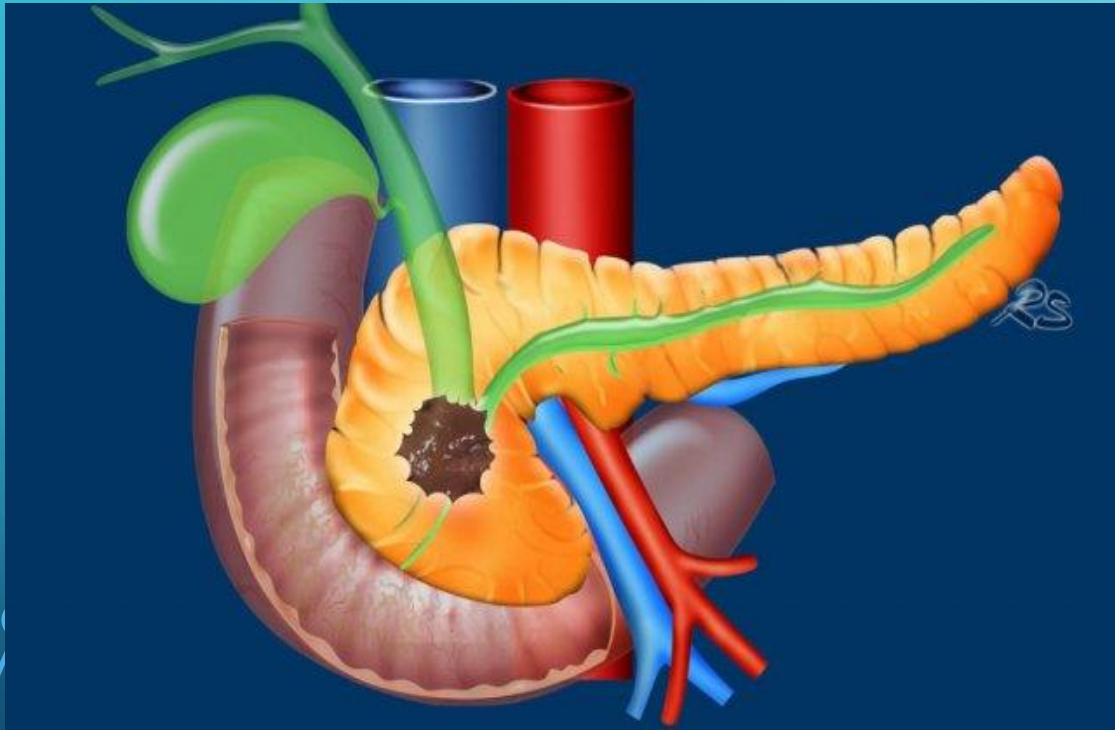


# HEPATIC ULTRASOUND 2





# CT & MRI



## ERCP ( ENDOSCOPIC RETROGRADE PANCREATO-CHOLANGIOGRAPHY)

